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Animal Welfare Information Center Newsletter

October-December 1990
Vol. 1, No. 4

ISSN: 1050-561X

Legislation Update

- **H.R. 5598 To Amend title 35, United States Code, to provide certain improvements to the patent law.**

Introduced September 12, 1990, and referred jointly to the Committees on the Judiciary and Science, Space, and Technology by Representative Robert Kastenmeier (D-WI). Title II may be cited as the "Transgenic Animal Patent Improvement Act." This section stipulates that, under certain conditions, it is not an act of infringement for a person to reproduce a patented transgenic farm animal.

- **H.R. 5328 To provide for the development of a comprehensive plan for monitoring and research on migratory non-game birds in the Western Hemisphere, to request the President to seek the declaration of a World Decade of Ornithology, and for other purposes.**

Introduced on July 20, 1990, to the Committee on Merchant Marine and Fisheries by Representative Jack Buechner (R-MO).

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An Effective IACUC: A Johns Hopkins Experience

By

Joan Poling

Assistant Director, Office for Research Subjects
Johns Hopkins School of Public Health

Institutional Animal Care and Use Committees (IACUC) have an enormous responsibility which must be carefully carried out. Whether in a small or large institution, the IACUC acts as the conscience of the institution regarding the care and use of animals.

In the biomedical research community, the IACUC serves as the educator and communicator of regulations, issues, policies, and procedures, in addition to the reviewer/approver of research, teaching, and testing protocols. These are significant roles in the life of an institution. Therefore, an IACUC must find the most prudent and workable way to carry out its responsibilities.

The Johns Hopkins School of Public Health IACUC is organized to include faculty representing departments involved in animal use, students, and administration. Voting members include: (1) faculty/researchers who review protocols and act as liaisons to their departments; (2) two students, as required by the school, who review protocols and report on activities to the Student Assembly; (3) the director of comparative medicine and the director of animal services who are responsible for the university animal

care program; and (4) two community members who represent community interests and review protocols. Ex-officio members include the associate dean for research, representatives of Spon-

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Editor's Corner

This issue of the Animal Welfare Information Center newsletter is devoted to the subject of Institutional Animal Care and Use Committees or IACUC's. The importance of a consistent, balanced, and efficient committee to the production of meaningful and thoughtful research cannot be overstated.

The authors contributing articles to this issue represent three areas where IACUC's function either by regulatory mandate, by institutional choice, or by both. Joan Poling, Director of the IACUC at the Johns Hopkins University School of Public Health, will provide insight into elements critical to smooth committee operation within a regulated research institution. Gary Joiner, D.V.M., Ph.D., is director of Laboratory Animal Care at Texas A&M University and has been the

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Editor's Corner Cont'd...

campus veterinarian since 1974. Dr. Joiner writes of the "Aggie" experience of designating IACUC's for agricultural animal research at his institution. Texas A&M currently maintains two IACUC's, one that handles all regulated research (including agricultural animals which fall into this category), and another that deals with agricultural animals used for agricultural research (nonregulated). Helene Guttman, Ph.D., an animal care biologist with the Agricultural Research Service (ARS), U.S. Department of Agriculture, outlines the new animal care directives implemented by ARS. Dr. Guttman provides a concise analysis of the new directives and outlines the specific duties of the IACUC.

For those of you who use the Animal Welfare Information Center, we have a column, written by staff member Cynthia Smith, entitled "AWIC User Tips." The "User Tips" column will explain policies and procedures that can help you to efficiently use our services.

The AWIC staff wish you and your families a safe, happy, and healthy holiday season.

Johns Hopkins Cont'd...

sored Projects, Government Affairs, Facilities Management, and the Safety Office, who act as consultants on matters pertaining to their office. As committee director, I organize and coordinate the IACUC responsibilities and activities.

Committee members are appointed by the dean of the School of Public Health. Appointments are based on recommendations given by the committee director to the associate dean for research, to whom the IACUC reports. The committee director seeks input from the chair and members. The committee is comprised of junior and senior faculty, with a senior faculty member as chair when possible. Student members who indicate interest are interviewed and selected by their

desire and availability to serve. The community members are recommended by IACUC members and interviewed by the director, chair, and the associate dean for research. Our community members are dedicated participants of the committee.

Protocol Review

Protocols are reviewed monthly by the IACUC. Each protocol is given an administrative review by the director and the chair. Protocols are sent to all voting members, and any other member who wishes to receive them, for review. Review criteria have been developed based on regulatory requirements and committee concerns. For example, regulations require that: (1) investigators consider alternative models or procedures, and (2) the proposed research is not unnecessarily duplicative. Individual IACUC members are assigned to verbally review one or more of the submitted protocols at the monthly meeting of the committee. Committee reviewers are encouraged to communicate any questions or required revisions to investigators before the IACUC meeting to facilitate an approved review of the protocol. Approval is granted for a 3-year period with yearly renewal/progress reports required.

If protocol problems are discovered in the committee review, the member/reviewer is responsible for communicating the concerns to the investigator and requesting revisions. The committee reviewer then checks the revisions to be certain they are in order and gives them to the IACUC director. Conditional approval may be granted with final approval given when the reviewer and/or director receive the needed information. A deferred approval requires full committee approval of revisions.

When the IACUC has major questions about a protocol, the investigator and any co-investigators are asked to meet with an IACUC task force or to attend the monthly meeting to discuss the areas of concern. The committee relies on the expertise of the director of compara-

tive medicine, the director of animal services, as well as on the knowledge of committee members who are familiar with the research. The opinions of outside experts may be secured if necessary. The IACUC has established a review process which assures that protocols are in compliance with regulatory requirements; and because of the committee's education of investigators as to what must be addressed, it is rarely necessary to disallow a protocol. If the IACUC questions the investigator's training/ability, the investigator will be asked to perform procedures for qualified committee members, including the veterinarians and scientific staff, to whom the final decision is delegated. A protocol will be inactivated and an investigation initiated, if anyone reports procedure-related problems involving research animals. Protocols will not be reinstated until problems have been fully resolved.

Establishing policies and procedures based on regulatory requirements ensures understanding regarding the responsibilities of both researchers/educators and the IACUC. It has been worth our committee time to develop a manual which includes: (1) the policies of the institution and its charge to the IACUC; (2) responsibilities of the researcher/educator; (3) the requirements and procedures for obtaining approval of protocols; (4) the process, criteria, and consequences of committee review; (5) a description of other committee functions; and (6) procedures for addressing concerns involving any inappropriate care or use of animals. Investigators' and committee members' use of the manual has enhanced the effectiveness of the protocol review process.

An important area of committee responsibility is overseeing the proper care and use of animals in the institution. This requires the development of institutional procedures for handling questions or concerns involving any inappropriate care or use of animals. We have created procedures for directing
(Cont'd p.6)

AGRICULTURAL ANIMAL CARE REVIEW

by
Dr. Gary Joiner
Director, Laboratory Animal Care
Texas A & M University

The care and use of agricultural animals at land-grant institutions have received less attention in terms of review procedures than the care and use of conventional "laboratory animals." This is principally because 1) farm-type animals are seldom involved in Public Health Service (PHS) related research and, therefore, may be exempted from institutional assurance statements to those agencies; and 2) farm animals have generally been exempted from Federal regulations. However, with the U.S. Department of Agriculture's (USDA) recent intent to regulate certain categories of agricultural animals based upon the type of usage rather than the species, institutions are wrestling with the appropriate means of oversight.

Farm animal research has traditionally involved production and nutritional studies to enhance the productivity and efficiency for meat, milk, and fiber production. Cattle, swine, sheep, goats, and poultry are commonly researched under commercial-like pastoral or housing conditions. Some research, such as nutrient utilization, reproductive and other physiological studies, and animal health, is conducted under confinement conditions. Surgery is not commonly performed in farm animal research other than routine husbandry practices (*i.e.*, dehorning and castration).

Recently, a consortium of several professional societies developed guidelines for the care of farm animals used in research. The "Consortium for Developing a Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching" recommended minimal care standards for housing, handling, nutrition, and space requirements of farm animals. In the absence of Federal guidelines, many universities and USDA laboratories have adopted these guidelines and

established formal institutional review procedures. However, several issues still prevail involving the use of agricultural species in research. These issues are:

1. USDA Animal and Plant Health Inspection Service (APHIS) recently redefined the coverage and use of "horses" as a non-agricultural species.

2. Some schools review veterinary research, but have not extended coverage to include animal science departments.

3. Some institutions have one committee that oversees all animal work (regardless of species or the focal point of the research, *i.e.*, biomedical or animal husbandry). Other institutions have established separate, but somewhat parallel, review committees (*i.e.*, a lab animal/biomedical research review and an agricultural/farm productivity committee).

Let us look at the current status and the broader implications of these few situations.

A determination of whether to add this type of research oversight to a pre-existing Institutional Animal Care and Use Committee (IACUC) or to form a separate farm animal care and use committee must be made. Institutions with a strong agricultural component must weigh the pros and cons of each approach. The following considerations support adding these duties to an existing IACUC:

1. Utilizes Experienced IACUC. Most IACUC's now have considerable expertise in dealing with existing laws and policies governing animal welfare. Members have learned how to conduct protocol reviews, inspect facilities and programs, conduct investigations of

purported misuse of animals, and handle all the required paperwork. The committee is properly constituted in terms of membership, includes an outside community member, and, in most instances, has an adequate support staff for the required clerical work.

2. Provides Uniformity of Reviews. Having only one committee aids in providing uniformity of protocol reviews. When researchers submit their protocols, they have a better understanding of what is required from them in terms of the paperwork and degree of justification required on the forms. [Note: Should the institution opt for a dual committee approach, it may be possible to use the same animal use protocol form for each committee, thereby reducing the confusion.]

3. Prevents Duplication of Effort. Having more than one animal care and use committee, while permissible under the law and the PHS policy, may: (1) create duplication of effort (*i.e.*, may involve visits to the same facility by multiple oversight groups); (2) place an additional burden on the attending veterinarian (who is often required to serve on both committees); and (3) include the risk of a review by the wrong committee.

A review by the wrong committee can be particularly problematic if the farm animal committee was established to deal only with farm animal subjects used for production purposes and did not intend to follow all of the federally mandated requirements of the traditional IACUC's (*i.e.*, semiannual review of programs and facilities, limited use of expedited reviews, issuance of formal reports to the institution official, *etc.*). In such a situation, the determination of what constitutes agricultural use versus nonagricultural use becomes of paramount im-

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AGRICULTURAL RESEARCH SERVICE, USDA PUBLISHES NEW ANIMAL CARE DIRECTIVES

By
Helene Guttman, Ph.D.
Animal Care Biologist
National Program Staff, ARS

On August 29, 1990, the Agricultural Research Service (ARS) published two new directives that updated the Agency's rules for animal-related activities. They are Directive 635.1 - Humane Animal Care and Use and Directive 130.4 - Animal Care and Use Committees. The ARS has been regulating animal care and use by its personnel since 1977.

It is ARS policy to assure that all ARS vertebrate research animals are treated humanely. All ARS research facilities and other facilities using ARS animals, funds, or personnel are covered by ARS regulations spelled out in the directives. The directives include: 1) compliance with the Animal Welfare Act (9 CFR 1, 2, and 3) for animals covered by that law, 2) compliance with the *NIH Guide for the Care and Use of Laboratory Animals* and, 3) the husbandry standards for farm animals used or intended for use for improving animal nutrition, breeding, management, or production efficiency, or for improving the quality of food or fiber (as described in chapters 5-11 of the *Guide for the Care and Use of Agricultural Animals in Agricultural Research and Teaching*).

ARS's Institutional Animal Care and Use Committees

The ARS requires an Institutional Animal Care and Use Committee (IACUC) overview of all vertebrate animals used at any ARS location regardless of source of funds, or at other locations using ARS animals or ARS personnel regardless of source of funds. Each IACUC must have a minimum of five members and must include at least: (1) one doctor of veterinary medicine with

training or experience in the care of the species in residence at the site covered by the IACUC; (2) one scientist experienced, and currently active, in research involving animals; (3) one member whose primary concerns are in a non-scientific area (e.g., ethicist, attorney, business person, clergy, etc.); and (4) one individual who is not affiliated with the ARS location in any way other than as a member of the IACUC and is not a member of the immediate family of a person who is affiliated with that ARS location. Inclusion of an animal technician or animal caretaker as a member is strongly recommended.

Duties of the IACUC

All ARS scientists proposing to use vertebrate animals must first gain approval of their proposal by an ARS IACUC. This process is commonly called protocol review. Protocol review meetings must be held frequently enough to assure timely transmission of the results to the principal investigator. Protocols can be reviewed by a subcommittee of the IACUC as long as: (1) all members of the IACUC receive a complete list of all protocol forms to be reviewed, and (2) any member of the IACUC can request a review of any form by the full IACUC. Any minority votes on a protocol review are recorded along with the grounds for the vote. Since protocols are approved for a maximum of 12 months, experiments of longer duration must be reviewed at least annually. After a protocol is approved, the IACUC monitors the approved animal use activities and inspects animal facilities (at least every 6 months) to assure that no substantial change is made in the approved procedures without submission of an amended

protocol. The IACUC promptly investigates all complaints regarding abuse of animals, nonconformance with an approved protocol, or non-compliance with the ARS directives concerning animal care and use. The IACUC chairperson and attending veterinarian can immediately suspend any animal-related activity that presents any major problems. Simultaneously, a meeting of the full IACUC is called to consider the problem and the problem is reported to the area director. If the problem cannot be corrected, the problem-causing activity can be terminated.

In addition to meetings specifically called to review protocols, IACUC's also hold at least semiannual meetings for other business. At least every 6 months the IACUC: (1) inspects all of the animal facilities (including those belonging to ARS and those used by tenant agencies on ARS property), satellite facilities, and any indoor study areas where animals are held for more than 12 hours [Inspection evaluations are based on the Animal Welfare Act, CFR Subpart 2C, the *NIH Guide for the Care and Use of Laboratory Animals*, and the *Guide for the Care and Use of Agricultural Animals in Research and Teaching* (chapters 5-11)]; and (2) reviews all ARS location's program for humane care and use of animals. The IACUC's prepare semiannual reports of their evaluations for the ARS area directors [There are eight ARS area directors that manage the nationwide ARS research program at 122 different locations (60 of these include animal research)].

The IACUC has a prominent role in procuring, developing, or recommending to the area director sources of training in humane care and use of animals and regulatory overview for ARS employees. Also included are those sources not directly involved with animal care and use. The attending veterinarian has the specific responsibility for assuring that animal surgery, pre- and post-surgical care, and recommended methods of euthanasia comply with

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Agricultural Animal Cont'd...

portance and can be difficult to determine. For example, one institution might determine that embryo transfer studies are agricultural in nature and are exempt from the new regulations. Another institution, however, might consider that particular procedure as "biomedical" or nonagricultural and would require review by a legally constituted committee. Disease studies involving meat-producing animals (*i.e.*, brucellosis) could easily fall into this "grey zone" and, thus, be routed differently by different institutions.

The real controversy that will ultimately arise is when the USDA inspector reviews the files and makes the determination that studies are not being reviewed in accordance with the Animal Welfare Act because of a difference in interpreting what is agricultural research and what is not. Therefore, if an institution chooses to set up two committees, one for regulated research and the other simply for general oversight of farm animal welfare without legally mandated functions, the routing mechanism becomes very critical. The rule of thumb would be to err on the conservative side and send all "grey zone" proposals to the legally constituted IACUC. It should be obvious that for the smooth operation of a dual-committee approach, there must be good lines of communication between the two groups.

Just as there are good reasons for having only one review committee,

there are valid reasons for forming a separate review committee for production agricultural situations. The following considerations support adding these duties to a totally separate farm animal committee.

1.Utilizes Agricultural Expertise. Most IACUC's have a limited agricultural representation, and members may be less familiar with recognized agricultural practices and standards. Having a separate agriculturally constituted committee can provide a wide range of expertise in evaluating programs and facilities and can provide firsthand knowledge about the various experiment station operations across the State.

2.Reduces IACUC Workload. Most IACUC's are heavily burdened already. Members have a sizable time commitment in reviewing protocols and facilities without additional responsibilities that are not federally mandated. Committee "burnout" is a real concern.

3.Increases Flexibility. Having a separate committee without governmental constraints gives the institution an opportunity to tailor the makeup and function of the committee to the institution's own unique needs. For example, an expedited review process for protocols involving noninvasive methods can be used extensively. In this situation, a review by one or two designated individuals may be sufficient and would reduce the overall burden on the committee. Reviews of facilities,

programs, and formal reports to administrators could occur at less rigid intervals. Arrangements for the review of remote experiment stations could be tailor-made using ad-hoc members from the outlying areas. If the conventional IACUC were given the responsibility for these experiment station reviews, it would create severe logistical problems during semiannual review periods, particularly in large States such as Texas.

4.Improves Agricultural Faculty Receptivity. Having a separate committee for production agricultural animals would provide an opportunity to sensitize agricultural faculty members to the animal welfare issues without all of the mandated sanctions and potentially heavy-handed committee oversight which currently exists with IACUC's. Agricultural faculty are not accustomed to such intensive oversight and cannot be expected to welcome it with open arms. Trying to impose all of the IACUC-type requirements upon agricultural faculty in their teaching and research programs, without the backing of a Federal requirement, would be a thankless task indeed.

It is generally accepted that farm animal welfare should be an institutional concern. How that objective can best be achieved, however, is sure to stimulate active discussion. In the end, each institution must decide what is best for the local situation.

We've Moved!

The Animal Welfare Information Center is now located in room 205 of the National Agricultural Library. Future correspondence should be sent to the following address:

Animal Welfare Information Center
Room 205
National Agricultural Library
Beltsville, Maryland 20705

Johns Hopkins Cont'd...

questions or reporting concerns. Concerns are directed to any appropriate person including the director of the laboratory involved, the department chair, the IACUC director or chair, the director of comparative medicine or the director of animal care services, and the associate dean for research.

In the same vein, we have procedures in place for adjudication of grievances against committee actions. Assurance is given that the IACUC will make all reasonable efforts to work with any individual involved to resolve any problem or difference. If an individual continues to feel that he/she received improper treatment, process, or judgement, then a grievance may be initiated. The individual may then file a written statement to the IACUC and/or the associate dean for research.

Education and Communication

Dealing with developing animal issues has become an important aspect of IACUC responsibility. An

atmosphere of open discussion is essential during committee deliberations. Education of committee members regarding points of view on the issues has been most helpful in establishing open dialogue. This is done through distribution of appropriate articles, bulletins, newsletters, and publications, along with information regarding available resources and outside conferences.

The Office for Research Subjects at Johns Hopkins School of Public Health houses both the IACUC and the Institutional Review Board (IRB). The IRB deals with the protocols involving human participants. The benefits of having the IACUC and IRB under one roof include sharing responsibilities for investigator orientation, education, support staff, and resources. A more consistent message emerges with regard to research ethics at the institution as well as procedures for protocol approval. Each director is involved in development of seminars dealing with issues of concern which are offered to investigators and staff. It is evident that this education has contributed to an increased awareness on the part of committee mem-

bers, researchers, educators, and administrators.

We have found that the key to the effectiveness of our IACUC is communication. It is important to establish a good communication link between the committee and the administration. Support by administration is essential to create IACUC credibility in the institution. It is equally important to develop a positive and cooperative communication exchange with investigators and educators. We have successfully communicated that the IACUC is, in fact, protecting the investigator; and this has led to a cooperative relationship.

An IACUC can be a productive and beneficial aspect of institutional life. Through thoughtful and responsible conduct, implementation of a well-planned communications system, and development of an education program, a committee for animal care and use can carry out its regulatory responsibility as well as its animal advocacy role.

ARS Directives Cont'd...

currently accepted veterinary practices. IACUC's oversee the preparation of annual animal reports which are required by: (1) the ARS Administrator for all vertebrate animals used during the year, (2) the Animal Welfare Act, and (3) various research grant-awarding agencies.

Annually, each ARS area director prepares summary reports based on the reports from the IACUC's which oversee animal use within that director's jurisdiction. These reports contain the locations' animal use reports, their IACUC membership rosters, plus any suggestions that require special attention of the ARS Administrator and his staff. The reports are forwarded to the Animal Care Office, National Program Staff, ARS, Beltsville, MD.

Suggested Readings on IACUCs...

*Clingerman, K.J. *Animal Care and Use Committees*. SRB 90-06. March 1990.

Driscoll, J.W. (Ed.) *Animal Care and Use in Behavioral Research: Regulations, Issues, and Applications*. Animal Welfare Information Center, National Agricultural Library, Beltsville, MD. September 1989. 120pp. (Available from NTIS, ph. (703) 487-4650)

*Engler, K.E. *Reference Materials for Non-affiliated Members of Animal Care and Use Committees*. SRB 89-08. May 1989

Guidelines for Lay Members of Animal Care and Use Committees. Canadian Federation of Humane Societies, Ontario. Revised 1986. 57pp.

Guttman, H.N., J.A. Mench, and R.C. Simmonds. *Science and Animals: Addressing Contemporary Issues*. Scientists Center for Animal Welfare, Bethesda, MD. February 1989. 149pp.

Orlans, F.B., R.C. Simmonds, and W.J. Dodds. "Effective Animal Care and Use Committees." *Laboratory Animal Science* 37 (Special Issue):1-178(1987).

* Available upon request from the Animal Welfare Information Center

AWIC User Tips:

Patrons interested in obtaining an article or book cited in an AWIC publication or elsewhere are encouraged to use the following guidelines:

1. First, contact your local or State libraries for availability.
2. If the item is not available, ask your librarian to initiate an interlibrary loan.
3. The first few pages of each AWIC bibliography contain statements concerning the National Agricultural Library's (NAL) policies on document delivery and interlibrary loan.
4. Certain materials are not available for loan from the National Agricultural Library (NAL). These materials include: serials such as journals and newsletters; rare, reference, and reserve books; microforms; and proceedings of conferences or symposia.
5. NAL will photocopy articles for a fee, providing the article is not over 50 pages.
6. If your librarian has any questions on interlibrary loan procedures, he or she may call (301) 344-3755.
7. Your librarian may also wish to request the following flyers:

"Document Delivery Services Available to Libraries, Other Information Centers and Commercial Organizations."

"Document Delivery Services to Individuals"

"USDA Regional Document Delivery System"

Send requests to:

USDA, National Agricultural Library
Document Delivery Services Branch
ILL 6th Floor
Beltsville, MD 20705-2351

If you would like to borrow an audiovisual (AV) from NAL, here are some helpful guidelines.

1. The AV collection of NAL includes motion pictures, filmstrips, slides, kits, games, audiocassettes, video recordings, posters, and transparencies. AV's are not loaned outside of the continental United States except for Hawaii, Puerto Rico, the Virgin Islands, and other U.S. territories.
2. First, contact your local or State libraries for availability. Ask your librarian to initiate an interlibrary loan if the item is not available.
3. Be sure to give your librarian the complete title and format (e.g., VHS) of the requested AV. Include the catalog number (up to four digits followed by a hyphen and the year, e.g., 1453-77) or a call number.
4. Let your librarian know when you are planning to show the AV. The AV will be mailed 1 week before the date. Since AV's may be sent by United Parcel Service (UPS), a street address should be included.
5. AV's should be ordered at least 3-4 weeks in advance. Up to three AV's may be ordered at one time, using one Individual Request Form (IRF).
6. Phone (301) 344-2994 to reserve audiovisuals.
7. To return the AV, use the return address label that comes with the item. Be sure all pieces are in the kit. Materials must be returned in their original boxes. Patrons are responsible for paying the return postage (first class) or an express delivery service fee.

Upcoming Meetings...

American Association for the Advancement of Science (AAAS), February 14-19, 1991. Washington, DC Contact: (202) 326-6448.

Western Veterinary Conference, February 17-21, 1991. Las Vegas, NV. Contact: (702) 794-0626.

Society of Toxicology, February 25-March 1, 1991. Dallas, TX. Contact: (202) 293-5935.

National Science Teachers Association (NSTA), March 27-30, 1991. Houston, TX. Contact: (202) 328-5800.

NIH Regional Workshop on Implementation of the Public Health Service Policy on Humane Care and Use of Laboratory Animals, April 4-5, 1991. Sponsor: University of South Carolina. Contact: (803) 792-3625.

NEW PUBLICATIONS AND UPDATES...

- *Humane Innovations and Alternatives in Animal Experimentation: A Notebook* (for more information contact the Psychologists for the Ethical Treatment of Animals at (202) 926-4817.
- *The LD50 (Median Lethal Dose) and LC50 (Median Lethal Concentration) Toxicity Tests, January 1980-August 1990* SRB 90-12
- *Animal Euthanasia* SRB 91-02
- *Training Materials for Animal Facility Personnel* QB 91-07
- *Equine Housing and Facilities* QB 91-05
- *Stress in Poultry* QB 91-01
- *Welfare of Poultry* QB 91-03
- *Stress in Sheep and Goats* QB 91-21
- *Beef Cattle Housing and Facilities* QB 91-20
- *Dairy Cattle Housing and Facilities* QB 91-19
- *Stress in Cattle* QB 91-18
- *Welfare, Care and Husbandry of Cattle* QB 91-17
- *Stress in Swine* QB 91-16
- *Swine Housing and Facilities* QB 91-15
- *Welfare, Care and Husbandry of Swine* QB 91-14
- *Calf Housing and Facilities* QB 91-13
- *Stress in Horses* QB 91-06
- *Poultry Housing and Facilities* QB 91-02
- *Welfare of Horses* QB 91-04

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ISSN 1050-561X

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ANIMAL WELFARE INFORMATION CENTER

NEWSLETTER

(ISSN 1050-561X)

is published quarterly by the National Agricultural Library and provides current information on laboratory animal welfare to investigators, technicians, administrators, and the public. Mention of commercial enterprises or brand names does not constitute endorsement or imply preference by the U.S. Department of Agriculture.

Janice Swanson, Ph.D., Editor

Karen Clingerman, M.S., Production and Layout

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